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Parents of terror victims. A longitudinal study of parental mental health following the 2011 terrorist attack on Utøya Island

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ABSTRACT

Background and aims: Little is known about parents' health following their children's exposure to trauma. We investigated the mental health of parents of young terrorist survivors and assessed parental distress and guilt as potential predictors of mental health.
Method: Mothers and fathers ($N = 531$) participated in two study waves 4–5 and 14–15 months after the shooting. Posttraumatic stress reactions (PTSS) and anxiety/depression were compared with age- and gender-adjusted expected scores that were calculated from a concurrent population study. Mixed effects models investigated the associations between parental distress, parental guilt, and mental health.
Results: Parents' level of anxiety/depression was three times higher and PTSS was five times higher than that of the general population. Parental distress and guilt about their child's traumatic experience contributed uniquely to symptoms at both time points.
Conclusions: Parents of traumatized youth constitute a vulnerable group that has been overlooked in the literature. Intervention strategies following trauma should include both survivors and their parents.

1. Introduction

Parenthood conveys many joys and many concerns. When children experience adverse events, their parents' health may be affected. For example, childhood illness has been shown to impact parents' psychological health (Klassen et al., 2007), and the loss of a child has been associated with premature parental death (Li, Precht, Mortensen, & Olsen, 2003). When a child is exposed to a traumatic event, a disaster, or a terrorist attack, parents may be intensely shocked or terrified. In recent years, there have been a number of shootings and terrorist attacks that have specifically targeted young people, such as the Beslan school hostage crisis, the Peshawar school attack in Pakistan, several school shootings in the USA and Finland, and the 2011 shooting attack at Utøya Island, Norway (Shultz et al., 2014). Despite these events, very little research has been conducted concerning parental health following children's exposure to terror. In this study, we examine the psychological health of parents of the young survivors from the shooting at Utøya Island. A better understanding of how child trauma affects parents is important not only because long lasting mental health problems can affect a parent's daily functioning but also because caregiver distress and possible loss of parental social support may affect the healing process of their traumatized child (Kerns et al., 2014; Shultz et al., 2014). Gaining a better understanding of how a terrorist attack affects parents' well-being thus seems warranted.

The concept of a parent "as a protective shield" has been used to represent how a parent's primary role is to take care of their child and to keep the child away from harm (Pynoos, Steinberg, & Piacentini, 1999). This adaptive function of caregiving has been described as a basic motivational system in parents (Solomon & George, 1996). This motivational system is particularly activated when offspring are threatened. In situations in which the motivational system is highly activated, but action is blocked (i.e., parents are not able to come to their child's aid), intense stress is a likely response. The unpredictability of a threat may keep parents alert for danger long after physical safety is reestablished, causing physiological distress, sleep disturbances, problems concentrating, etc. Additionally, when parents feel that they have failed in keeping their child away from harm, they may experience guilt feelings. These negative emotions along with concern about their offspring's

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ability to manage the experienced trauma may induce or maintain post-traumatic stress symptoms (Ehlers & Clark, 2000). Furthermore, parents may be faced with challenges in managing their children's posttraumatic distress, physical injuries, grief, or reduced level of functioning. Feelings of shortcomings in meeting their children's needs may add to the perception of oneself as a less competent parent.

Studies on parental mental health following trauma have primarily focused on two areas (Lambert, Holzer, & Hasbun, 2014). One area has demonstrated that parents' exposure to trauma and their posttraumatic stress reactions can have an impact on their child's mental health (Dekel & Goldblatt, 2008; Wickrama, 2008). For example, one study found elevated levels of anxiety and depression in the offspring of parents with posttraumatic stress disorder (PTSD) (Leen-Feldner, Feldner, Bunaciu, & Blumenthal, 2011). In a study of the adult offspring of Holocaust survivors, parental posttraumatic stress disorder was found to be associated with PTSD in the offspring, and parental trauma exposure was similarly associated with the prevalence of offspring depression (Yehuda, Halligan, & Bierer, 2001). However, the results of these studies are not conclusive. A study of Australian Vietnam veterans failed to find any significant associations between posttraumatic stress in the veterans and their offspring (Davidson & Mellor, 2001). The second line of research has focused on the development of symptoms in parents who have shared traumatic experiences with their children, such as families exposed to disasters (Dyb, Jensen, & Nygaard, 2011; Leen-Feldner et al., 2011; Samuelson & Cashman, 2008). One study, for example, found that caregiver distress was associated with child functioning across several domains following the 2013 Boston Marathon Bombing (Leen-Feldner et al., 2011). A meta-analysis concluded that parental depression and PTSD symptoms were associated with child PTSD symptoms across the included studies (Morris, Gabert-Quillen, & Delahanty, 2012). In shared traumas, parents' symptoms may result both from their personal experience of trauma and from worries related to their child's experience.

Much less research has been conducted on the mental health symptoms of parents after their children have experienced severe trauma. Critical illness and injuries in children may be highly stressful for the entire family, and unmet needs in family members are frequently reported (de Vries et al., 1999; Shudy et al., 2006). A few studies have described distress in parents following the sexual abuse of their children (Davies, 1995; Dyb, Holen, Steinberg, Rodriguez, & Pynoos, 2003; Elliott & Carnes, 2001) as well as in mothers of deployed US soldiers (Slaven-Lee, Padden, Andrews, & Fitzpatrick, 2011). We were able to identify only one previous study on parents of terror survivors; in that study, high levels of psychological symptoms were identified in 20 caregivers three months after the Beslan school hostage crisis in 2004 (Scrimin et al., 2006). Additionally, they found that the caregivers and the exposed children had similar levels of PTSD symptoms, indicating that terrorism affects the whole family even when only the children are under attack.

1.1. The terrorist attack

On July 22, 2011, a bomb explosion hit the government quarter of Norway's capital, Oslo. Following the explosion, a shooting attack occurred on Utøya Island, where a summer camp was being hosted for adolescent and young adult members of the Norwegian Labor Youth Party. On Utøya Island, the terrorist hunted down and shot those who he encountered, resulting in the death of 69 people. The shooting lasted for a considerable time period (approximately 90 min), and parents could follow the events as they unfolded through mass media or via phone contact with their sons or daughters. In the aftermath of the attack, many parents faced changes in their offspring, such as those related to physical injuries and/or trauma-related symptoms (Dyb, Jensen, & Nygaard, 2014).

In this study, we investigate the mental health in the parents of the survivors of the shooting at Utøya Island. None of the parents were present at the island, hence, potential stress reactions can be attributed to what happened to their son or daughter, not to a threatening experience directed to them personally. Studies on terror and disasters often face sampling problems and include participants with large variations in exposure. In contrast, survivors in this case were identified by their presence on the island, and all the parents in this study experienced more or less the same trauma, namely an acute life threat to their offspring. To provide a comparison to the level of mental health problems in parents, we conducted a concurrent study of the general population, from which expected scores were calculated (Thoresen, Aakvaag, Wentzel-Larsen, Dyb, & Hjemdal, 2012). In addition, we investigated the relationship between a parent's emotional reactions to their child's experiences and the parent's mental health.

1.2. Hypotheses

1. The level of posttraumatic stress reactions and anxiety/depression is significantly increased in the parents of Utøya survivors compared to the general population; and
2. Parental distress and guilt are significant predictors of symptom development in parents 4–5 months and 14–15 months after the terrorist attack.

2. Methods

2.1. Participants and procedure

The Utøya Study is a longitudinal investigation of the health and well-being of survivors and their parents. The study was coordinated with an outreach program, and the data collection was designed to serve as an additional security net. Interviewers with clinical training investigated the unmet needs of the participants and facilitated referrals when appropriate. More information about the study and the outreach program has been published elsewhere (Aakvaag, Thoresen, Wentzel-Larsen, Røysamb, & Dyb, 2014; Dyb, Jensen, Glad, Nygaard, & Thoresen, 2014; Dyb, Jensen, Nygaard et al., 2014; Stene & Dyb, 2015).

The mothers and fathers of survivors who were between 13 and 32 years of age (97.9%, $N = 318$) were mailed invitations to participate and were subsequently contacted via phone. Parents of older participants and parents whose offspring did not participate in the study were not approached. Parents of individuals who had died on Utøya Island were not included in this study, with the exception of a few parents who also had sons or daughters who had survived the shooting. Because of restricted interviewer capacity, parents of survivors aged 19 or above answered a pen-and-pencil questionnaire (31.8% of wave one and 33.6% of wave two), and parents of younger survivors were interviewed face-to-face (68.2% of wave one and 66.4% of wave two). All interviews were conducted individually, and informed consent was obtained from all participating parents. The study was approved by the Regional Committee for Medical and Health Research Ethics in Norway.

Wave one was conducted 4–5 months and wave two 14–15 months following the terrorist attack. In total, 531 parents participated in the study at one or two time points. In wave one, 453 parents participated, of whom 196 were men (43.3%) and 257 were women (56.7%); in wave two, 426 parents participated, consisting of 173 men (40.6%) and 253 women (59.4%). A total of 348 parents (65.5% of all participants), including 137 men (39.4%) and 211 women (60.6%), participated in both waves.

In wave one, 94.9% ($N = 430$) of the caregiver participants were biological parents, 3.5% ($N = 16$) were step-parents, and 1.5% ($N = 7$) were other caregivers (not specified for anonymity reasons). The types of households reported included both parents living together (60.9%, $N = 276$), one parent living with a new partner (20.1%, $N = 91$), single parent households (18.5%, $N = 84$), and other households (0.4%, $N = 2$).

Of all the individuals who were present at the Utøya Island during the shooting who were between 13 and 32 years of age ($N = 482$), 330 survivors (68.5%) had at least one participating caregiver in wave one and/or wave two. Of the survivors who participated in the Utøya Study in wave one and/or wave two ($N = 348$), 279 survivors (80.2%) had a caregiver who participated in wave one, 294 (84.5%) in wave two, and 267 (76.7%) in both waves. A more comprehensive investigation into participation and parental representation, including flow charts, has been described elsewhere (Stene & Dyb, 2016).

We conducted a concurrent population-based study that served as our comparison group. A representative sample was drawn from the General Population Registry of Norway. All individuals received a postal invitation letter and were subsequently contacted via telephone and asked whether they were willing to participate in the study. Telephone interviews were conducted by the data collection agency Ipsos MMI and were timed to match the wave one data collection in the Utøya study, i.e., 4–5 months following the terrorist attack. The overall response rate of the general population sample was 30%. A more detailed description of the subjects and methods is published elsewhere (Thoresen et al., 2012).

2.2. Measures

2.2.1. Mental health (wave one and wave two)

DSM-IV posttraumatic stress symptoms over the past month were measured using the University of California at Los Angeles PTSD Reaction Index (PTSD-RI) (Steinberg, Brymer, Decker, & Pynoos, 2004). The PTSD-RI is a 20-item scale in which responses are recorded on a 5-point scale ranging from 0 ('never') to 4 ('most of the time'). Three items have two alternative formulations, and the highest score is used to calculate the total score; hence, 17 items compose the total symptom scale score. Parents were asked to report their PTSD symptoms related to the terrorist attack. The PTSD-RI for the DSM-IV does not include any items measuring guilt. The Norwegian version of the PTSD-RI has previously shown good psychometric properties (Jensen, Dyb, & Nygaard, 2009) in children and adolescents. The PTSD-RI was calculated as a mean score with a Cronbach's alpha of 0.92 in wave one and 0.93 in wave two. The PTSD-RI scale in its entirety was used as the outcome measure for parental mental health, and a 9-item version of this scale was used to assess the symptom levels in parents in the general population.

Anxiety/depression over the past two weeks was measured using the mean score of eight items from the Hopkins Symptom Checklist-25 (HSCL) (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) that were rated on a scale from 0 ('not bothered') to 3 ('bothered a whole lot'). Short versions of the HSCL have shown good psychometric properties (Strand, Dalgard, Tambs, & Rognerud, 2003; Tambs & Moum, 1993), as has the eight-item version used in this study (Myhre, Thoresen, Grøgaard, & Dyb, 2012). The Cronbach's alpha was 0.90 for wave one and 0.92 for wave two.

Mental health in the population study: The population study included nine items from the PTSD-RI, as suggested by the authors of the index (A. Steinberg, personal communication, 2011). These nine items measured re-experiencing, avoidance, and hyperarousal symptoms specifically related to the terrorist attack. The Cronbach's alpha for these nine items was .85 in caregivers and .66 in the general population sample. The mean of the nine items correlated highly with the mean of the full scale among caregivers ($r = .97$, $p < 0.001$). The population study also included the eight item HSCL identical to those administered to the caregivers. The HSCL is a measure of anxiety and depression, and in contrast to the PTSD-RI, it does not connect symptoms to any specific event. The Cronbach's alpha for the HSCL-8 was .88 in the general population sample.

2.2.2. Parental emotional reactions (wave one)

A revised version of the Parent Emotional Reactions Questionnaire (PERQ) (Mannarino & Cohen, 1996) was used to measure parents' reactions to their children's traumatic experiences. Recent reports have identified the following three PERQ subscales: (a) Parental distress, (b) Parental guilt, and (c) Parental shame (Holt, Cohen, Mannarino, & Jensen, 2014; Holt, Cohen, & Mannarino, 2015). The parental shame subscale was not applied in this study. Four of the eight *parental distress* items were used in this study. The other four items were excluded due to potential conceptual overlap with the mental health outcome measures (sleep problems, anger, headache/stomach ache, and fear). The four item scale applied in this study correlated highly with the total scale ($r = .92$). The Cronbach's alpha was .82 for the four-item scale. *Parental guilt* was measured by four items using a revision suggested by other studies (Holt et al., 2014; Holt et al., 2015) and in cooperation with the developers of the PERQ. The Cronbach's alpha was .82 for the four parental guilt items. For all PERQ items, parents were asked to rate their feelings in the past two weeks on a 5-point Likert scale ranging from 1 ('never') to 5 ('always'). The parental distress and parental guilt items are listed in Table 1.

Peritraumatic reactions (wave one), which were defined as the emotional and physiological reactions experienced during or immediately after the event, were recorded using six items developed by the authors (Jensen et al., 2009; Nygaard, Jensen, & Dyb, 2012). Fear, helplessness, horror, confusion, peritraumatic dissociation and rapid heartbeat were rated from 0 ('not at all') to 4 ('very much'), and a mean score was calculated (Cronbach's alpha = 0.71).

2.2.3. Terror exposure (wave one)

The participants were parents of survivors of the Utøya shooting, meaning they had all experienced having a child in a life-threatening situation. We included the following questions about additional terror exposure ('yes' or 'no' answers): (a) "Were you aware of the Oslo bombing before the shooting started at Utøya Island?"; (b) "Did you worry about the safety of a close friend or a family member because of the bombing?"; (c) "Was a close friend or a family member injured in the terrorist attack?"; (d) "Was a close friend or a family member killed in the terrorist attack?"; (e) "Did you have telephone/SMS contact with your son/daughter during the shooting?"; and (f) "Was your son/daughter physically injured at Utøya Island?".

Demographic variables included gender, age, ethnicity (Norwegian versus non-Norwegian origin), current occupational status (working at least 50% or not), and perceived financial situation (average/better versus lower/much lower than average).

2.3. Statistical analyses

T-tests were used to test for gender differences in mean parental distress and parental guilt.

2.3.1. Comparison of symptom levels in Utøya parents and the general population

For each of the caregivers in the Utøya study in wave one ($n = 453$), we calculated an expected score of PTSS and anxiety/depression based on means from the general population sample for each 5-year age group and gender (Hjermstad, Fayers, Bjordal, & Kaasa, 1998). The general population study included 700 individuals in the parents' age range (28–73 years), and the mean number

Table 1
Frequencies of wave one parental emotional reactions by gender.

PERQ items (last two weeks)	Mothers				Fathers			
	Never/ seldom		Sometimes/often/ always		Never/ seldom		Sometimes/often/ always	
	%	N	%	N	%	N	%	N
Parental distress								
I have felt upset about my child's trauma	14.8	38	85.2	218	23.7	45	76.3	145
I think about what happened to my child while I am working	24.4	62	75.6	192	25.7	49	74.3	142
I have felt sad about my child's traumatic experience	7.8	20	92.2	235	14.8	28	85.2	161
I have cried about my child's traumatic experience	27.6	71	72.4	186	46.3	88	53.7	102
Parental guilt								
I feel that I should have been able to keep the trauma from happening	93.8	241	6.2	16	92.7	178	7.3	14
I have felt angry at myself about my child's traumatic experience	89.4	228	10.6	27	93.8	180	6.3	12
I have felt responsible for my child experiencing trauma	92.2	237	7.8	20	90.1	172	9.9	19
I have felt responsible for my child's reactions after what happened	82.7	211	17.3	44	88.4	168	11.6	22

$N = 444–449$.

of observations in the general population sample within each gender and age group was 44 (ranging from 27 to 58). The expected score could not be calculated for five (PTSS) and six (HSCL) individuals due to missing information on age and/or mental health, resulting in comparisons between the observed and expected PTSS scores for 448 individuals and HSCL scores for 447 individuals. We present the caregivers' observed symptom scores, their expected symptom scores, and the ratio between the observed and expected symptom scores. The statistical significance of potential differences between caregivers' observed and expected scores was tested using mixed effects analyses to account for the dependency of observations within family units.

2.3.2. Associations between potential predictors and mental health

We conducted two separate mixed effects models, one for PTSS and one for anxiety/depression. Caregivers were nested in family units, and a family unit variable was produced to account for the dependency of observations. Interactions with time were included in the model for the following selected study variables: peritraumatic reactions, PERQ parental distress, and PERQ guilt. The centering values for these three variables were chosen following the inspection of histograms and descriptive information. The models were conducted as complete observation analyses. Random effects were judged as stable if their confidence bounds were not exceedingly small or large (Pinheiro & Bates, 2000).

Statistical analyses were conducted in IBM SPSS statistics version 22 and R (The R Foundation for Statistical Computing, Vienna, Austria, 2013) with the R package nlme for mixed effects analyses.

3. Results

The 531 participants in this study included 232 (43.7%) fathers and 299 (56.3%) mothers. Their mean age was 48.2 years (range 28–73 years, SD = 6.5) at the time of the terrorist attack. The vast majority of the participants was of Norwegian origin (91.8%), were currently working (89.5%), and perceived their financial situation to be average or better than others (87.0%).

Of the parents who participated in wave one, almost all (96.5%, $N = 437$) knew about the Oslo bombing before the shooting started at Utøya Island, 39.0% ($N = 176$) worried about the safety of a close friend or a family member because of the bombing, and 23.7% ($N = 104$) had a close friend or a family member injured or killed in the shooting and/or bombing. More than half (58.2%, $N = 263$) reported that they had telephone/SMS contact with their sons or daughters during the shooting, and 18.8% ($N = 82$) had a son or a daughter who sustained physical injuries on Utøya Island.

3.1. Mental health in parents compared with the general population

Fig. 1 displays the histograms of the observed and expected mean 9-item PTSS and HSCL-8 scores for wave one and the ratio between the observed and expected scores.

The distribution of expected scores was highly skewed. The observed scores of parents were much less skewed, indicating increased symptom levels. The values to the right of the vertical line depicted in the ratio histograms indicate observed PTSS and HSCL scores that were higher than expected. The mean PTSS-9 score of parents (1.24) was about five times higher than expected (0.24), and the mean HSCL-8 score of parents (0.69) was about three times higher than expected (0.24). The mixed effects models showed that the observed scores were significantly higher than the expected scores for PTSS (difference = 1.0, 95% CI = 0.9–1.1, $p < 0.001$) and anxiety/depression (difference = 0.5, 95% CI = 0.4–0.5, $p < 0.001$).

A reduction in mental health symptoms was observed from wave one to wave two for both mental health measures ($p < 0.001$). Parents' wave two PTSS score (mean 9-item PTSS = 1.05) was however about four times higher and wave two anxiety/depression (mean HSCL = 0.59) score was about 2.5 times higher than the wave one expected scores calculated from the population study.

3.2. Parental distress and parental guilt

Parents' emotional reactions to their children's exposure to terror are shown in Table 1. Both mothers and fathers reported high levels of distress about their children's exposure, whereas guilt about what had happened was less frequent. Mothers and fathers did not differ significantly in reported guilt (mothers: mean = 1.4, SD = 0.7; fathers: mean = 1.3, SD = 0.6; *t*-test *p* value = 0.203), but mothers reported significantly more parental distress than fathers (mothers: mean = 3.4, SD = 0.9; fathers: mean 3.0, SD = 0.8; *t*-test *p* value <0.001).

3.3. Factors associated with mental health in parents

The unadjusted associations of independent variables with PTSS and anxiety/depression are shown in Table 2. Having had telephone/SMS contact with their sons or daughters during the attack was not significantly related to these two outcomes, and having had someone close to them injured or killed in the attack was not significantly related to anxiety/depression; all other variables were significantly associated with mental health.

Table 3 displays the results of two separate mixed effects models with PTSS (PTSD-RI) and anxiety/depression (HSCL-8) as outcome

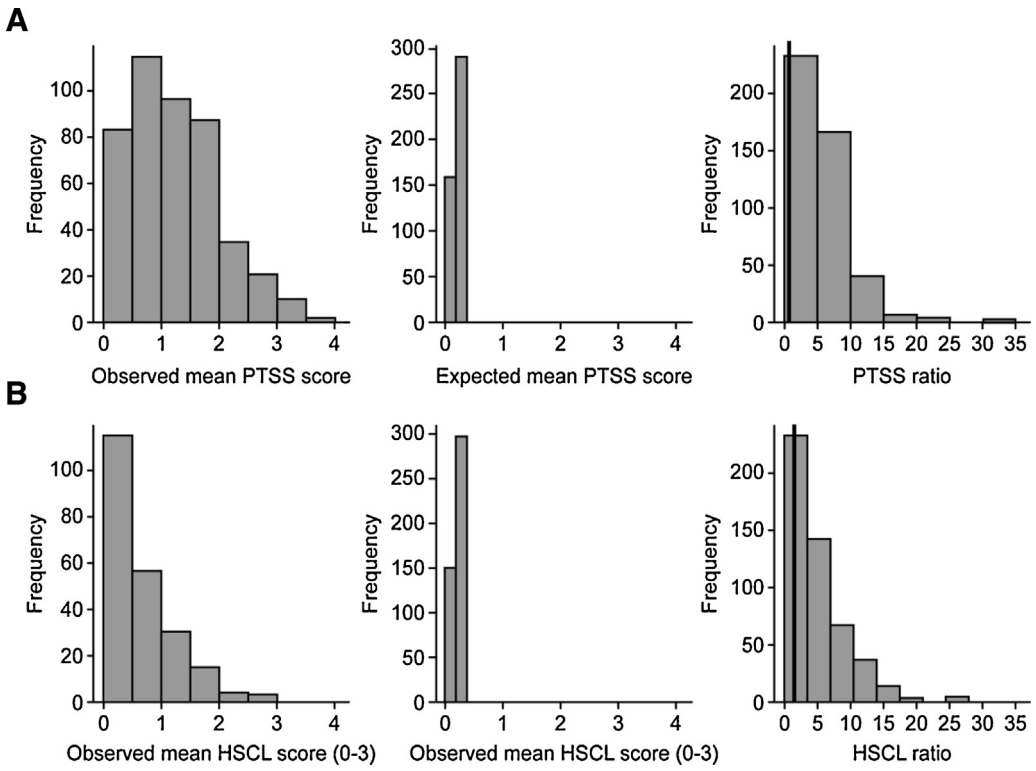

Fig. 1. Observed PTSS-9 and HSCL-8 scores of parents of Utøya survivors (left histograms), expected scores based on the general population (middle), and the ratio between the observed and expected scores (right).

Table 2
Unadjusted mixed effects models for posttraumatic stress reactions (PTSD-RI) and anxiety/depression (HSCL-8).

Independent variables	Posttraumatic stress reactions			Anxiety/depression		
	Coefficient	95% CI	*p*-Value	Coefficient	95% CI	*p*-Value
Terror exposure						
Worry about someone close	0.26	0.12, 0.40	<0.001	0.20	0.09, 0.31	<0.001
Cell phone contact	0.04	−0.10, 0.19	0.541	0.04	−0.07, 0.16	0.461
Someone close injured/killed	0.18	0.01, 0.34	0.040	0.11	−0.03, 0.24	0.122
Son/daughter injured	0.39	0.20, 0.57	<0.001	0.30	0.15, 0.45	<0.001
Emotional reactions						
Peritraumatic reactions	0.40	0.33, 0.46	<0.001	0.25	0.20, 0.31	<0.001
Parental distress	0.50	0.44, 0.57	<0.001	0.33	0.27, 0.39	<0.001
Parental guilt	0.58	0.49, 0.68	<0.001	0.45	0.37, 0.53	<0.001
Demographics						
Gender (female)	0.42	0.31, 0.54	<0.001	0.34	0.24, 0.43	<0.001
Age	−0.02	−0.03, −0.01	0.004	−0.01	−0.02, −0.01	<0.001
Ethnicity (non-Norwegian)	0.62	0.37, 0.87	<0.001	0.45	0.25, 0.66	<0.001
Financial situation (poor)	0.34	0.13, 0.56	0.002	0.35	0.18, 0.52	<0.001
Occupational status (not working)	0.30	0.07, 0.52	0.010	0.22	0.04, 0.40	0.017

measures. The results indicate that parents' distress and feelings of guilt in relation to their children's traumatic experience contributed uniquely to PTSS and anxiety/depression, both in a short (4–5 months) and an intermediate (14–15 months) time perspective. In addition, parents' peritraumatic reactions and offspring's terror-related physical injuries were associated with both PTSS and anxiety/depression.

In the PTSS model, the interactions of time by peritraumatic stress and time by parental distress were significant, and the regression coefficients were lower for wave two PTSS scores, indicating that the relationships between peritraumatic stress, parental distress and PTSS were somewhat reduced over time. The interaction of time by parental guilt on PTSS scores was not significant. Similarly, for HSCL scores, the interaction of time by parental distress was significant but the interaction of time by parental guilt was not, indicating that the association between parental distress and HSCL but not the association between parental guilt and HSCL lessened somewhat from wave one to wave two.

There were no significant interactions between gender and peritraumatic reactions, parental distress, or parental guilt for PTSS or HSCL (although the interactions between gender and parental distress were close to significant: $p = 0.057$ for PTSS and $p = 0.072$ for HSCL, other interactions p values ≥ 0.332).

The PTSS model showed stable confidence intervals for random effects: family unit: 95% CI = 0.16–0.33; between individuals within units: 95% CI = 0.30–0.42; and repeated measures within individuals: 95% CI = 0.28–0.33. Similarly, the anxiety/depression model resulted in stable confidence intervals for random effects, as follows: family unit: 95% CI = 0.13–0.30; between individuals within

Table 3
Adjusted mixed effects models for posttraumatic stress reactions (PTSD-RI) and anxiety/depression (HSCL-8).

Independent variables	Posttraumatic stress reactions			Anxiety/depression		
	Coefficient	95% CI	*p*-Value	Coefficient	95% CI	*p*-Value
Time	−0.21	−0.26, −0.16	<0.001	−0.15	−0.20, −0.10	<0.001
Gender (female)	0.20	0.10, 0.30	<0.001	0.19	0.10, 0.28	<0.001
Worry about someone close	0.06	−0.04, 0.16	0.273	0.05	−0.04, 0.14	0.308
Cell phone contact	−0.00	−0.10, 0.10	0.953	0.02	−0.07, 0.11	0.719
Someone close injured/killed	0.01	−0.11, 0.12	0.905	−0.00	−0.11, 0.10	0.992
Son/daughter injured	0.14	0.01, 0.27	0.035	0.13	0.01, 0.25	0.030
Associations with mental health at wave one[a]						
Peritraumatic reactions	0.18	0.11, 0.25	<0.001	0.09	0.03, 0.15	0.006
Parental distress	0.32	0.25, 0.40	<0.001	0.20	0.13, 0.27	<0.001
Parental guilt	0.32	0.22, 0.41	<0.001	0.28	0.19, 0.36	<0.001
Associations with mental health at wave two[a]						
Peritraumatic reactions	0.10	0.03, 0.18	0.006	0.04	−0.03, 0.11	0.238
Parental distress	0.26	0.18, 0.33	<0.001	0.13	0.06, 0.20	<0.001
Parental guilt	0.31	0.21, 0.41	<0.001	0.31	0.22, 0.41	<0.001

The PTSS model includes 259 family units, 412 caregivers, and 729 PTSS observations; the HSCL model includes 259 family units, 412 caregivers, and 727HSCL observations. Adjusted for age, ethnicity, financial situation, occupational status, and mode of inquiry (interview versus questionnaire). Interactions with time were included for peritraumatic distress, parental distress, and parental guilt. For PTSS, statistically significant interactions were observed for time by peritraumatic stress reactions ($p = 0.013$) and time by parental distress (p value = 0.044) but not for time by parental guilt (p value = 0.835). For HSCL, a statistically significant interaction was observed for time by parental distress (p value = 0.047) but not for time by peritraumatic reactions (p value = 0.150) or for time by parental guilt (p value = 0.396).

[a] Time difference (time 2–time 1) was estimated for the following values of the three variables that had an interaction with time: peritraumatic reactions = 2.5; parental distress = 3.25, and parental guilt = 1.2.

units: 95% CI = 0.25–0.37; and repeated measures within individuals: 95% CI = 0.29–0.34.

4. Discussion

Almost all parents reported elevated levels of PTSS and anxiety/depression four to five months after the shooting compared with the Norwegian general population. We found a three-fold excess of anxiety/depression symptoms and a five-fold excess of PTSS scores in the parents of survivors. In the intermediate time frame, 14–15 months after the attack, parental PTSS and anxiety/depression scores were reduced but were still far higher than the expected scores. This study thus highlights parents' vulnerability to mental health problems when their adolescent or young adult offspring's lives are threatened by danger and suggests that parents may be vulnerable for a considerable period of time after traumatic events.

Earlier studies have shown elevated mental health problems in parents following their children's experience of sexual abuse, physical injuries and medical conditions and following shared traumatic events (Lambert et al., 2014). It is worth noting that the elevation in parent's symptoms found in this study was almost comparable to that of the survivors who were present on Utøya Island during the shooting (Dyb, Jensen, Nygaard et al., 2014). Similar results were found in a small study of the Beslan school hostage crisis in 2004, in which parents' PTSS were very high (Scrimin et al., 2006). For parents, the experience of having a child's life in danger may be just as traumatizing as experiencing a threat to oneself.

In this study, we investigated two factors that may be related to symptom development: parents' distress about what happened to their children and parental guilt. The vast majority of our participants reported high levels of parental distress, i.e., feeling upset, thinking a lot about the trauma, or feeling sad or crying. Parents' worry about their offspring is understandable and can be linked to an awareness of their children's vulnerability and fear about their children's future. Parental distress about what happened was associated with increased mental health problems, especially in the short-term, but also in the intermediate time frame.

Feelings of guilt were much less prevalent in this sample. Nevertheless, trauma-related parental guilt showed a strong association with both PTSS and anxiety/depression at both time points. Being a bystander and not being able to help or prevent terrible things from happening to one's child represents a breach in the implicit contract between parents and children that parents are expected to protect their children (Pynoos et al., 1999). Parents may feel that they have failed in this fundamental task, which could result in rumination about what they should have done and questions about whether they could have foreseen the events or are to blame. Additional feelings of guilt may arise if parents are unable to prevent the development of mental health problems in their children following the trauma.

Furthermore, parental distress and guilt related to their child's trauma were both independently associated with mental health problems, indicating that these two parental responses may trigger or maintain mental health problems through different mechanisms. Trauma-related guilt in parents seemed to be more important than parental distress in maintaining psychological problems over time, even at the relatively low guilt levels that were reported in our study. Such negative appraisals may serve to maintain symptoms, which is consistent with Ehlers and Clark's (2000) cognitive model of PTSD. In the current study, this effect was not restricted to posttraumatic stress; it was equally present for anxiety/depression. This result concurs with a previous study (Ehring, Frank, & Ehlers, 2008) that proposed that trauma-related negative cognitions may be related to a broader spectrum of mental health problems than posttraumatic stress.

Following terrorist attacks and other disasters, resources are limited, and early intervention strategies may need to focus on the most vulnerable groups. Our results show that parents of severely traumatized young people constitute a vulnerable group and should be targeted in early intervention and follow-up strategies. As studies have documented that many individuals do not actively seek help after a traumatic experience, different screen and treat or stepped care models for intervention are recommended (Brewin et al., 2008; McDermott & Cobham, 2014). The mothers in our study reported more mental health problems than fathers. Nevertheless, fathers and mothers alike reported high parental distress following the attack on their child, and parental distress and parental guilt were associated with early and later posttraumatic stress symptoms as well as anxiety/depression for both mothers and fathers. Thus, when reaching out to parents, fathers should not be forgotten. The shooting at Utøya Island was impossible to

predict and no parents were to blame for what happened to their child. Nevertheless our study shows that even in such a situation, guilt may burden parents. Clinicians should be aware of this, and routinely explore guilt when consulting parents.

Parental mental health is of importance in its own right but will also likely have consequences for their offspring's healing processes (Norris et al., 2002). Parents' mental health problems may interfere with their ability to support their children, and previous research has found parental support to be a key protective factor following trauma for both children and young adults (Allwood, Bell-Dolan, & Husain, 2002; Shultz et al., 2014). Barriers to social support have been documented in the Utøya survivors, and one reason why survivors did not utilize social support was because they felt that other people "had enough of their own problems", and the survivors did not wish to add to other's burdens. These barriers to social support were associated with increased mental health problems in the survivors (Thoresen, Jensen, Wentzel-Larsen, & Dyb, 2014). Interventions that help parents cope with their own distress and anxieties may make it easier for parents to support their children (Allwood et al., 2002) and for their children to ask for and receive support without feeling that they are burdening their parents.

4.1. Limitations and strengths

In this study, we compared the level of symptoms in parents of survivors with data from a general population study that we conducted for that purpose. Although the timing of the two studies was the same and identical measures were used, the degree to which the population study results were representative of the general population remains uncertain. We had no data on the non-participating parents and were thus unable to investigate potential systematic differences between participants and non-participants. This study used a combination of face-to-face interviews and paper-and-pencil questionnaires, and some measures such as symptom reporting may have been affected by the data collection method. The PERQ items and subscales are still under development and may need refinement in future studies (Holt et al., 2015). The validity of the PTSD-RI for adults is not established, and the reliability of the PTSD-RI was in the lower range for the population study. Peritraumatic distress was measured with a scale that has not been validated in other studies at four to five months (wave one), and reporting may have been affected by the time that had elapsed since the terrorist attack. Although we did account for the nested structure of our data, parents were analysed as individuals, not as couples. Information about health service utilization could have added to our understanding of symptom reduction over time, and other omitted variables could have influenced the results, such as previous mental health and previous traumatic experiences.

The strengths of this study include the longitudinal design, the sufficient sample size, the participation of both mothers and fathers, the low level of missing data, the ability to compare parents' psychological reactions with those of the general population, the repeated measurements, and the relatively high participation rate of parents of affected and participating survivors. In this sample, the parents were not exposed to a personal threat, as is the case in research on shared trauma. Thus, the increased level of mental health symptoms may be largely attributable to their children's traumatic experiences. In addition, the traumatic exposure was relatively uniform and likely unrelated to the personal histories of the parents.

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Conflict of interest

None.

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